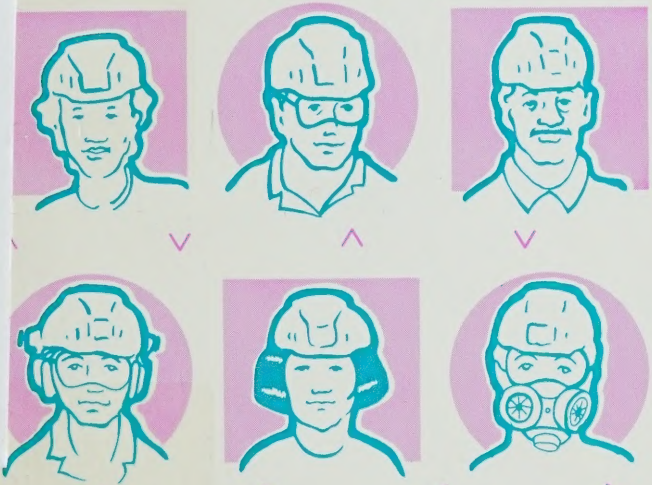
Ministry of Labour
Ontario

Construction Regulations Compliance Guidelines

SCAFFOLDING FOR MASONRY CONSTRUCTION



PREFACE

This guideline is intended to provide assistance to employers, supervisors, and workers in erecting and using masonry scaffolds in compliance with the Regulations for Construction Projects. The specifications and recommendations contained in this publication are not all-inclusive. The requirements of the Regulations for Construction Projects and the Occupational Health and Safety Act must be complied with and should be referred to when using this guideline.

The Ministry of Labour wishes to thank the members of the Masonry and Allied Trades Labour-Management Health and Safety Committee and the Construction Safety Association of Ontario for their technical input and assistance in the development of this guideline.

INTRODUCTION

Sections 125 - 149 of the Regulations for Construction Projects set out general safety requirements for the erection, use and dismantling of scaffolds on construction projects.

Scaffolding used in masonry construction is normally subjected to heavy loading conditions. Accordingly, a number of the sections specify requirements for scaffolding used in masonry work which are in addition to the general scaffold requirements. The following information is intended to provide assistance to employers, supervisors and workers in the masonry construction industry.

⊳ Selection of Components

Tubular metal frames used to support masonry materials must have a manufacturer's rated load capacity of at least twenty-two kilonewtons (5,000 lbs.) for standard frames and at least 16.7 kilonewtons (3,800 lbs.) for walk-through frames. Light duty frames having less than these values must not be used for a masonry scaffold. In addition, the contractor and supervisor should require the equipment supplier to provide documentation verifying that the frame and the other parts of the scaffold have been properly tested in compliance with Section 127, subsection (1) of the regulations.

⊳ Foundations and Support Surfaces

Scaffolds must be erected on surfaces which can adequately support all loads that will be applied by the scaffold.

Floors are usually adequate to support scaffold loads of workers, tools and light materials. However, as loads become greater, floors — especially older wooden floors — should be examined to ensure they can support the anticipated loads. In some cases, shoring below the floor and directly under the scaffold legs may be necessary. In other situations sills which span the floor support structure and help to distribute the load may be required.

Backfill material must be well compacted and levelled when used to support scaffolds. Mud and soft soil should be replaced with compacted gravel or crushed stone. Embankments that appear to be unstable or susceptible to erosion by rain must be contained. Otherwise the scaffold must be set back far enough to avoid settlement or failure of the

embankment (**Figure 1**).

Where mudsills must be placed on sloping ground, the area should be excavated, whenever possible, to provide a level base to support the mudsill. Levelling up the slope with backfill will not afford adequate support and should not be done (**Figure 2**).

In some cases it may be necessary to use half-frames to accommodate a grade change. Required side bracing may be provided by using tube-and-clamp components (**Figure 3**).

Scaffolds erected on any type of soil must be supported on a mudsill. The mudsill must consist of a plank or equivalent material having a minimum size of 51 mm X 25.4 cm (2" x 10") and be continuous under at least two consecutive supports. Scaffold base plates should rest centrally on the mudsill. Where possible, the sill must project at least 30 cm (1 foot) beyond the scaffold leg (**Figure 1**). Mudsills may be placed either along the length or across the width of the frames, provided the soil requirements above are met.

The use of bricks, short pieces of lumber or scrap under scaffold legs does not meet the requirements of Section 128, subsection (1) (**Figure 4**). Vibration can cause this material to move or shift and leave a scaffold leg unsupported. Under such conditions, and with the heavy loads typical of the masonry industry, the scaffold can topple.

If packing is required to install the scaffold in a level position, the packing should consist of 51 mm x 25.4 cm (2" x 10") lumber at least 60 cm (2 feet) in length. The total thickness of the packing should not exceed 20 cm (8 inches). All packing must be structurally sound and nailed or otherwise secured to

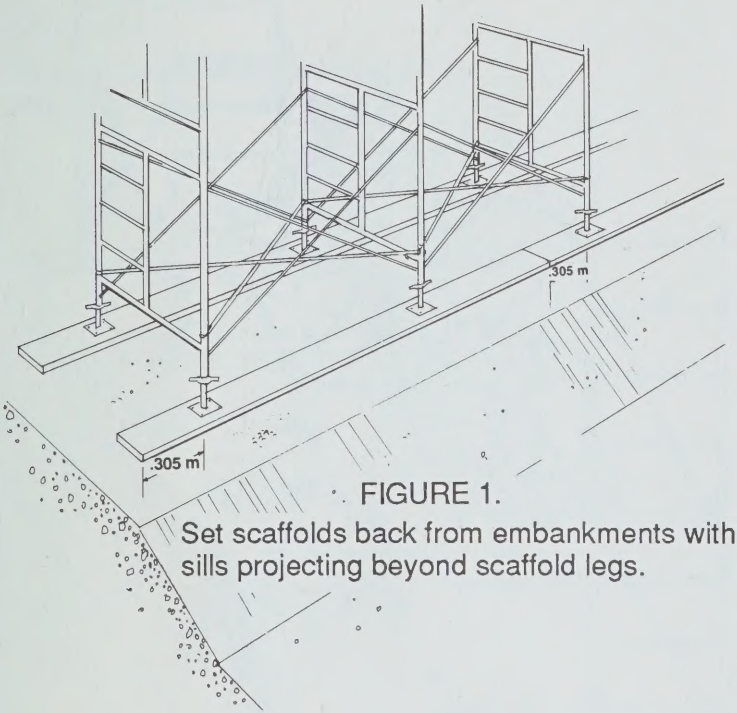


FIGURE 1.
Set scaffolds back from embankments with sills projecting beyond scaffold legs.

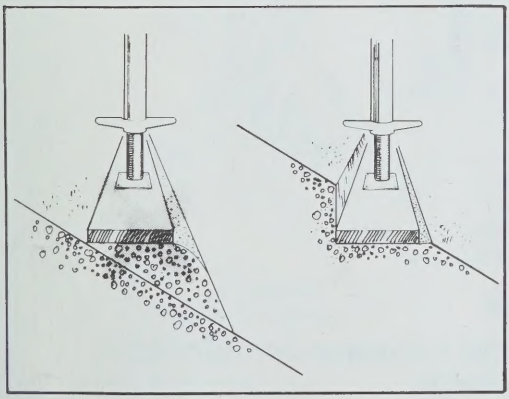


FIGURE 2.
Slope levelled up with backfill does not give adequate support.

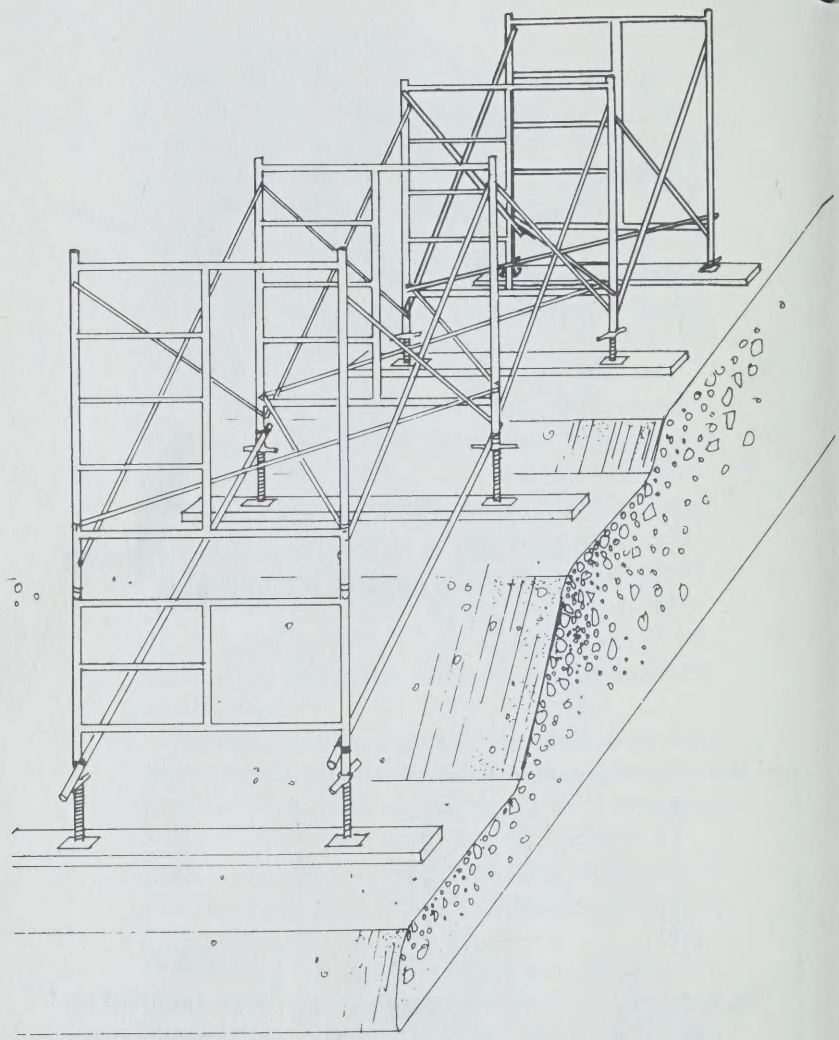
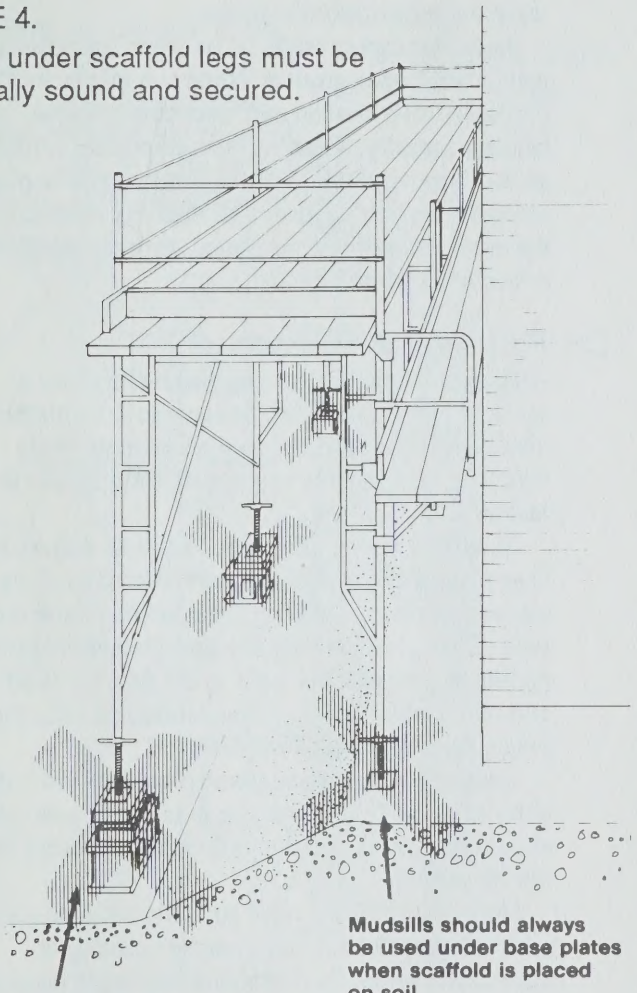


FIGURE 3.

Side-braced half-frames accommodate a grade change.

FIGURE 4.

Packing under scaffold legs must be structurally sound and secured.



resist movement from vibration.

Particular care must be taken when scaffolds are erected on frozen ground. When soil thaws, it becomes water-soaked and loses considerable bearing capacity. Thawing is an important consideration where tarpaulins or other covers will be placed around a scaffold loaded with masonry materials and the enclosed area will be heated, as is frequently the case during winter.

▷ Fittings and Accessories

All parts, fittings and accessories required for a scaffold must be installed in accordance with the manufacturer's instructions. Failure to properly install all components can significantly reduce safety factors and stability.

Base plates must always be installed. Adjustable base plates (screw jacks) should be used to allow for minor adjustments to keep the scaffold plumb and level. Base plates are usually provided with holes for nailing to mudsills. As soon as the first tier is erected and plumbed with base plates centred on sills, the plates should be nailed in place.

Bracing in the vertical plane is required on both sides of every frame. Bracing in the horizontal plane should be provided at the joint of at least every third tier of frames.

Horizontal bracing must coincide with the point at which the scaffold is tied in to the building or structure (**Figure 5**). Horizontal bracing is necessary to maintain scaffold stability and ensure full load-carrying capacity. Horizontal bracing on the first tier helps to square up the scaffold before base plates are nailed to mudsills.

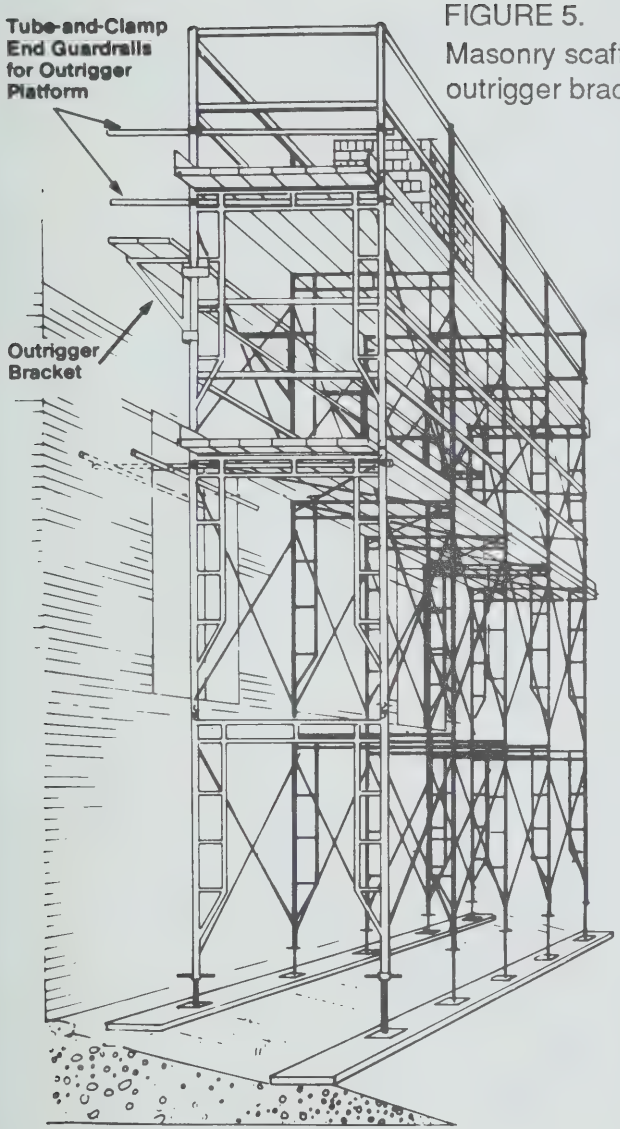


FIGURE 5.
Masonry scaffold with outrigger brackets.

Every scaffold manufacturer provides coupling devices to join scaffold frames together in the vertical plane. **Figure 6** illustrates various types. These are often omitted in the belief that the bearing weight of the scaffold and its load will keep the frame above firmly resting on the frame below. However, if the coupling devices are not used, when the scaffold moves or sways the joint may pull apart causing a collapse of the scaffold. Section 128, subsection (1) requires that coupling devices be installed properly on every leg of the scaffold at every joint as assembly proceeds. Nails or wire used as cotter pins in coupling devices do not meet the requirements of this section.

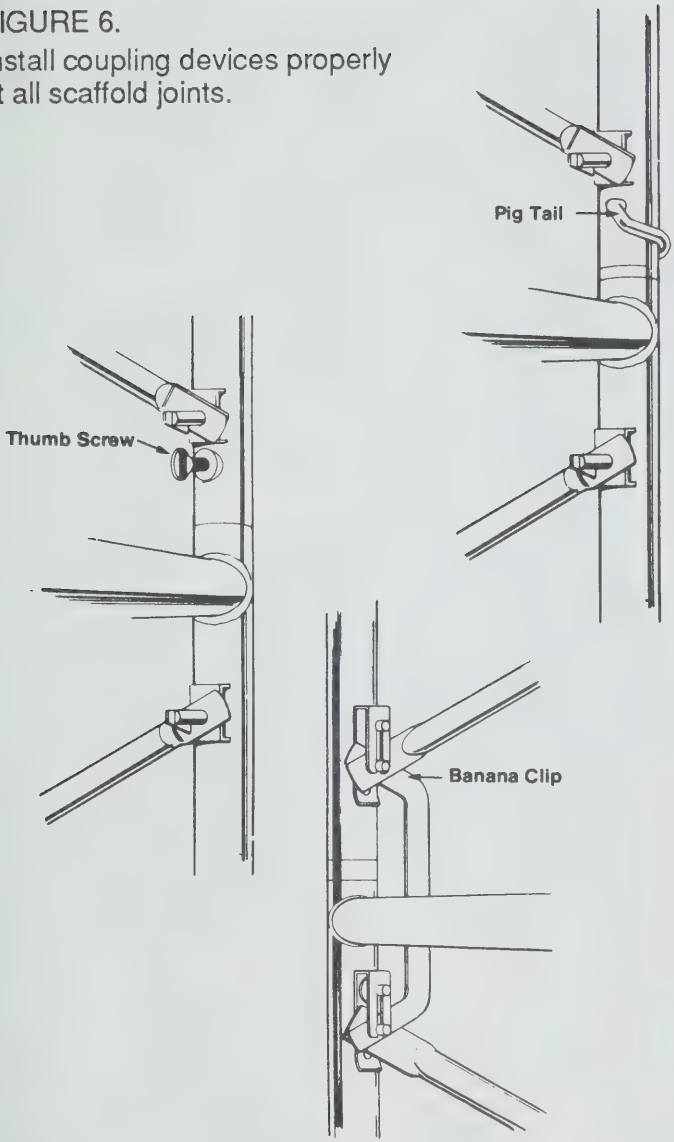
Wheels or castors on rolling scaffolds must be securely attached to the frame and equipped with brakes. Failure to properly attach wheels or castors to the frame has caused many serious accidents and fatalities involving rolling scaffolds. Brakes on wheels or castors should be well maintained and easy to apply.

▷ Tie-in Requirements

The ratio of a scaffold's height to its smallest lateral dimension should not be more than 3 to 1. Scaffolds exceeding this 3-to-1 rule must be tied in to the building or structure. For tubular frame scaffolds, tie-ins should be installed at every third frame vertically and every second frame horizontally. For tube-and-clamp scaffolds, tie-ins should be installed at every second node vertically and every third standard horizontally.

Tie-ins must be capable of sustaining lateral loads in both tension (pull) and compression (push). Tying

FIGURE 6.
Install coupling devices properly at all scaffold joints.

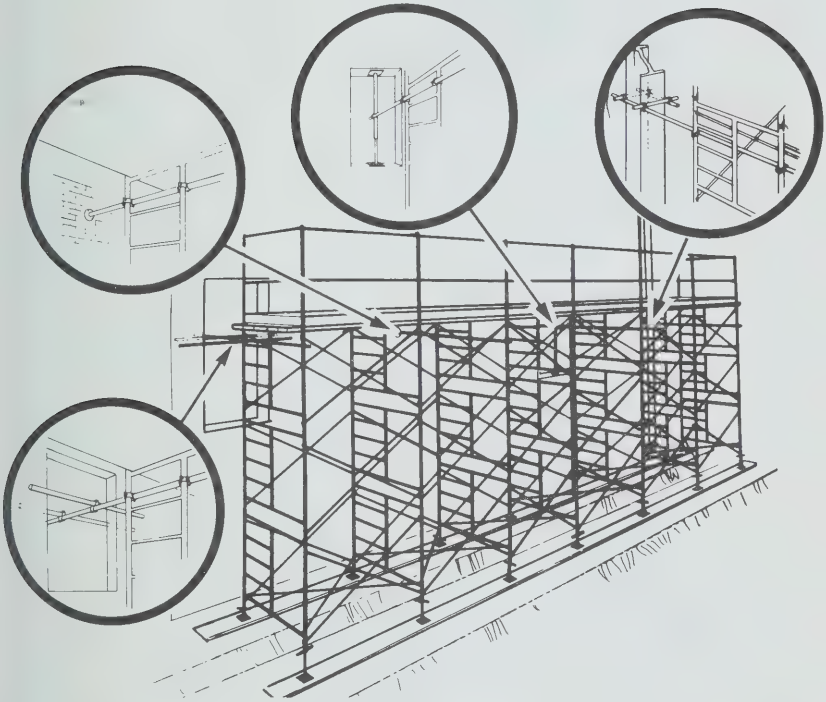


in with a couple of loops of wire provides some support in tension but does not resist compression forces. Proper ties provide lateral support for the scaffold and prevent any movement which could affect stability. Movement of the scaffold, particularly under heavy loading conditions, can initiate a collapse or cause a worker to fall off the platform. **Figure 7** illustrates various tie-in methods.

Tie-in systems must be designed to resist all loads that are likely to be applied including wind loads and dynamic loads caused by work being done on the scaffold. The tie-in system must be designed and constructed to resist twice the anticipated load without exceeding the allowable unit stress of the material used.

Wind loading on a scaffold can seriously affect tie-ins and bracing. These loads vary not only with wind speed but also with location, exposure and the height and shape of the building or structure on which the scaffold is being used. In addition, scaffolds enclosed for winter construction or sandblasting will be subjected to significantly larger wind loads because of the greater surface area presented by tarpaulins or other covers. If severe winds are expected a professional engineer should be consulted about tie-in requirements. In any event, it is absolutely essential that tie-ins be properly installed to prevent swaying, rocking and scaffold collapse.

FIGURE 7.
Proper tie-ins provide lateral support and stabilize the scaffold.



▷ Scaffold Platforms

(a) Sawn Lumber Planks

Rough sawn planks 51 mm x 25.4 cm (2" x 10") or larger have been the standard scaffold platform material for many years. They are also the least expensive of the common platform materials. Planks should meet or exceed the requirements for select structural or Number 1 grades of the spruce-fir-pine (SFP) species group or douglas fir. In addition, the planks must be identified with a permanent legible grade stamp. Ideally this stamp should be applied at the mill or by a certified lumber grader. If this is not possible, the constructor may have a competent worker examine and cull the planks and then apply a permanent stamp or plate which indicates that the planks are suitable for scaffold platform purposes.

The load-carrying capacity of scaffold planks varies with span, size and location of applied loads. **Table 1** provides guidance regarding spans and loads for simply supported single span conditions. The table provides maximum pallet loads based on unit stresses from Canadian Standards Association Standard CAN3-086-1984 "Engineering Design in Wood" for Number 1 grade SFP plank platforms.

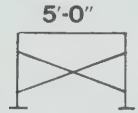
Scaffold planks must be inspected regularly because they deteriorate with use and age and are subject to damage. **Figure 8** illustrates defects to look for in culling planks. Planks with these defects should not be used as scaffold platform material.

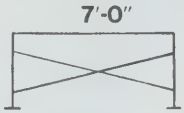
(b) Platform Loading

In most situations, cubes of masonry materials should weigh no more than 1,360 kg (3,000 lbs.)

Cubes should be placed on a platform of 51 mm x

TABLE 1: MAXIMUM LOAD ON PLANKS FOR SCAFFOLD PLATFORMS 5 FEET IN WIDTH





4'x4' PALLET LOADS (POUNDS)	Layers of Planks —	Layers of Planks =	Layers of Planks ≡	Layers of Planks —	Layers of Planks =	Layers of Planks ≡
4000	SEL STR	No. 1			SEL STR	No. 1
2900	No. 1				No. 1	
2430	No. 1			SEL STR	No. 1	
1760	No. 1			No. 1		
1520	No. 1			No. 1		

NOTES:
1. Planks are spruce-pine-fir species group (SPF)
2. Planks are at least 1-7/8" thick and at least 9-3/4" wide.
3. Grade is either Number 1 (No.1) or select structural (SEL STR).
4. Allowable stresses conform with CSA Standard (CAN3-086-1984 "Engineering Design in Wood".
5. No stresses increases are included for load sharing or load duration.
6. Scaffold platforms are 5' wide and fully decked in.
7. Loads indicated are maximum for grade and loading conditions. Shaded areas indicate that no SPF grades are capable of carrying the loads.
8. As an alternative to the above, the employer may have a specific arrangement designed and certified by a professional engineer.

25.4 cm (2" x 10") planks directly over a scaffold frame so that the frame is under the middle third of the pallet **(Figure 9).**

Where a scaffold has already been erected and the pallets cannot be placed directly over a frame, the platform supporting the pallet should be constructed in accordance with **Table 1.** This will involve either reducing the span to 1.5 metres (5 feet) for the platform where the pallet is to be placed or installing a double layer of planks at a span of 2.2 metres (7 feet) **(Figure 10).**

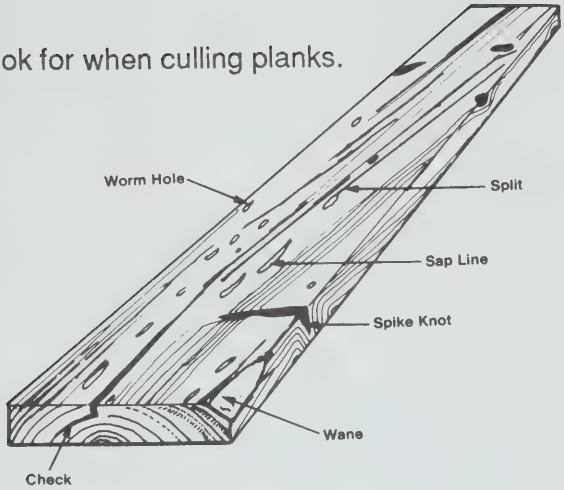
As an alternative to these requirements the contractor may have a professional engineer design a specific type of platform to meet the design requirements of Section 134.

(c) Outrigger Platforms

Outrigger platform brackets should be placed so that the distance between the level where the mason stands and the level on which materials are stored is no more than one metre (39 inches). This should allow a worker of average height to comfortably reach materials on the upper platform **(Figure 11).**

To avoid the need for masons to reach for materials from the top of a cube while working on the outrigger platform, materials must be distributed along the length of the storage platform before handling by the mason.

FIGURE 8.
Defects to look for when culling planks.



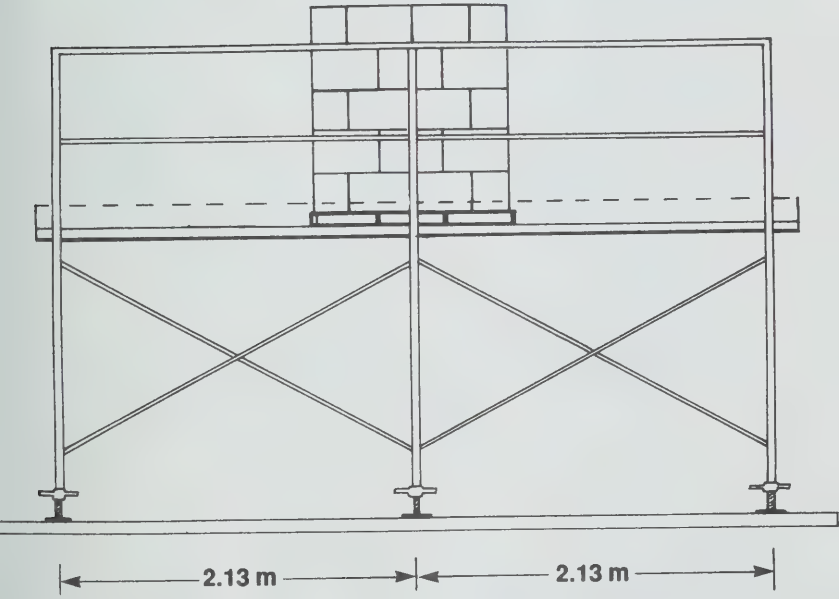


FIGURE 9.
Place cubes directly over scaffold frame.

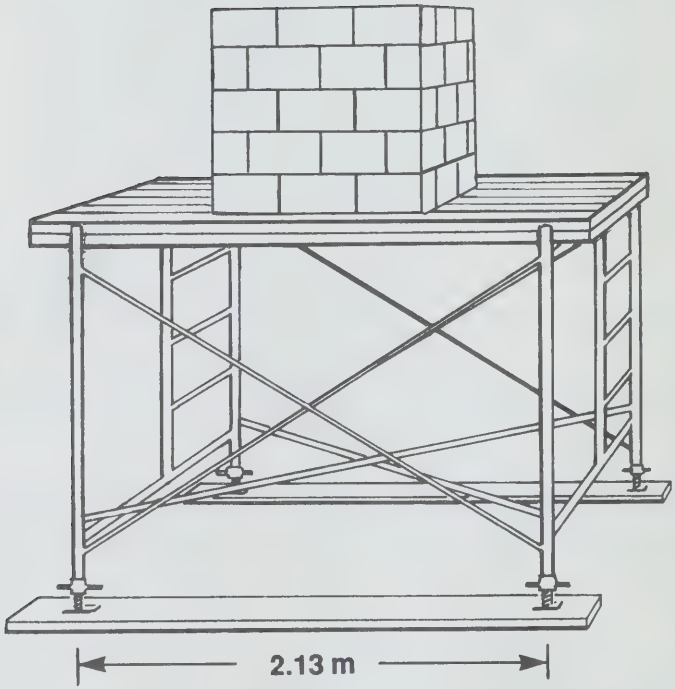
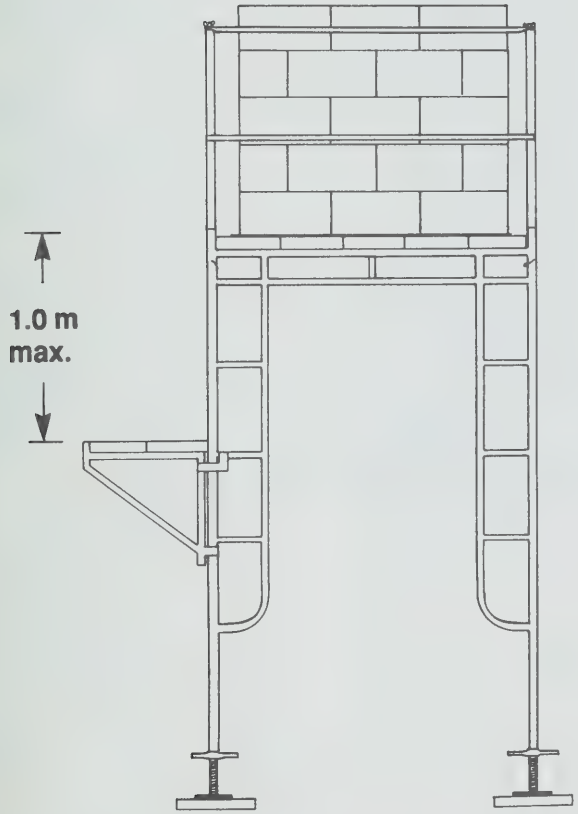


FIGURE 10.
Double planking supports pallets placed between frames.

FIGURE 11.
Place outrigger platform brackets to keep materials within easy reach.



Supervision and Inspection

Scaffolds should always be erected under the supervision of a person experienced in scaffold erection and use. Although scaffolds vary between manufacturers, certain fundamental requirements are common to all systems.

Frame scaffolds over 15 metres (50 feet) in height or tube-and-clamp scaffolds over 10 metres (32 feet) in height must be designed by a professional engineer. Drawings of the proposed scaffold system must be provided to the supervisor before installation begins. The drawing(s) must be stamped by a professional engineer and be kept at the project while the scaffold is in use. The supervisor must ensure that all scaffold components are constructed in accordance with the design.

The supervisor must inspect scaffold installations, whether tube-and-clamp or frame, and keep a written record of the inspection. These reports should be sent to the professional engineer who designed the scaffold and must also be kept on the project.

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